TECHNICAL MANUAL

OPERATION AND MAINTENANCE INSTRUCTIONS WITH ILLUSTRATED PARTS BREAKDOWN

FOR

BATTERY TESTER TS-183B/U

Manufactured by:

COMSPACE CORP.
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Amityville,N.Y.11701

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CHAPTER 1
INTRODUCTION

1–1 PURPOSE AND SCOPE

1-1.1 Purpose. This manual provides operation and maintenance instructions with a illustrated parts breakdown for Battery Tester TS-183B/U (see figure 1-1) herein after referred to as the battery tester.

1-1.2 Scope. This manual contains descriptive text that identifies essential characteristics of the battery tester. Equipment description, preparation for use, shipment and storage, theory of operation, operating procedures, cleaning, inspection, troubleshooting disassembly, repair, reassembly and parts list are all provided to maintain the battery tester at the organizational and intermediate levels of maintenance.

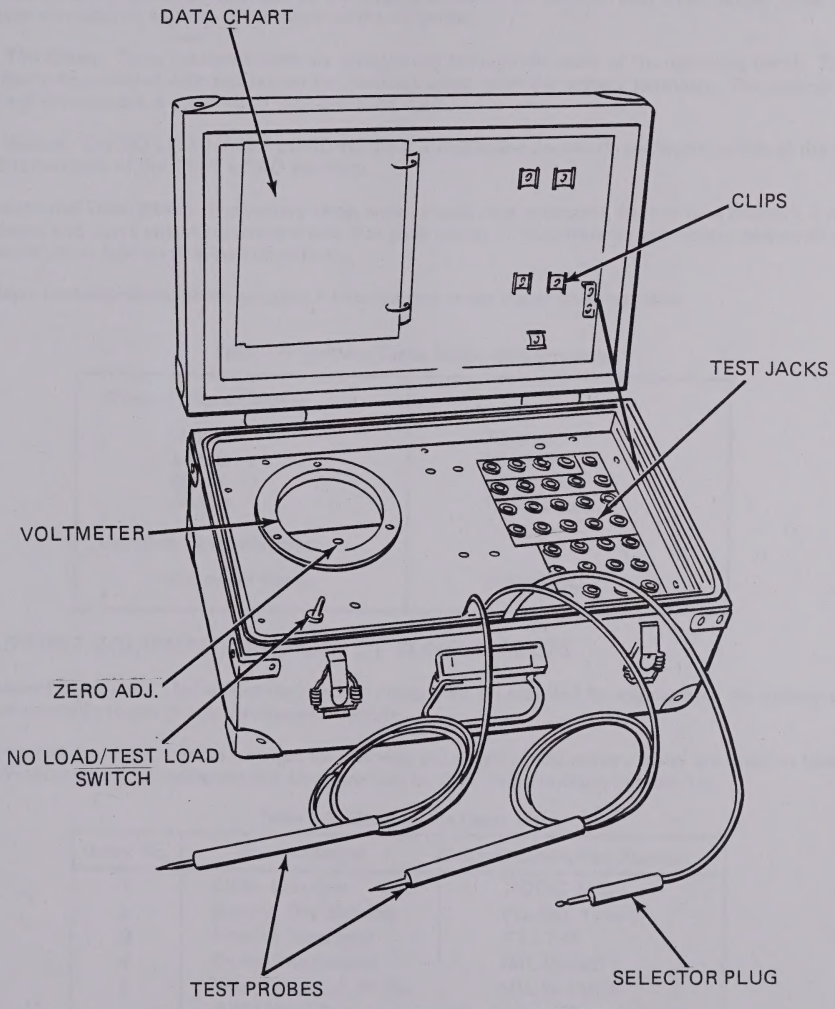


Figure 1-1 Battery Tester TS-183B/U

1–2 EQUIPMENT DESCRIPTION

1-2.1 Physical Description. The battery tester is a self-containd portable unit enclosed in a carrying case with handle. The carrying case cover is secured to the case with two hinges and catches. The inside of the cover has two clips to store the test leads and a looseleaf notebook ring binder for holding data sheets. A gasket fastened to the upper part of the case makes the battery tester water and dust resistant. The operating panel is made of metal and mounts a voltmeter, 32 test jacks, three test cords, and a NO LOAD/TEST LOAD switch. Mounted to the underside of the panel are load and multiplier resistors.

1-2.1.1 Voltmeter. The voltmeter is hermetically sealed in a metal case and has four voltage ranges; each range scale is a different color. The pointer of the meter may be adjusted to zero by means of the ZERO ADJ screw.

1-2.1.2 Load Resistors. The load resistors are mounted on angle brackets on the underside of the operating panel.

1-2.1.3 Jacks. The 32 jacks are arranged on the righthand side of the panel in four color ranges. Each color range of the jacks corresponds to a like color range on the voltmeter.

1-2.1.4 Test Cords. Three insulated cords are brought out through the front of the operating panel. The two left-handed cords are provided with test probes for making contact with the battery terminals. The selector plug for making jack connections is attached to the right-hand cord.

1-2.1.5 Switch. The NO LOAD/TEST LOAD switch is a single-pole double throw toggle switch of the spring return type and is normally in the TEST LOAD position.

1-2.2 Functional Description. The battery tester uses a multirange voltmeter, a set of load resistors, a set of multiplier resistors and a jack switching arrangement that gives a total of 32 different load resistor combinations to test dry batteries under load and no load conditions.

1-2.3 Major Characteristics. Refer to table 1-1 for battery tester major characteristics.

Table 1-1 Battery Tester Major Characteristics

Physical Characteristics	
Height	7 inches
Length	15 inches
Width	9.5 inches
Weight	15 lb approx.
Electrical Characteristics	
Voltmeter Range	0-200 VDC

1–3 SUPPORT EQUIPMENT AND LIST OF CONSUMABLES

1-3.1 Support Equipment. No special tools or test equipment are required for maintaining the battery tester other than those normally found in any maintenance facility.

1-3.2 Consumables. Consumables required for cleaning and repairing the battery tester are listed in table 1-2. In the text of this manual, consumables will be referenced by their index number in table 1-2.

Table 1-2 Consumable Items List

Index No.	Nomenclature	Specification/Part Number
1	Cloth, Lint-free	DOD-C-24671
2	Solvent, Dry cleaning	PD-680, Type II
3	Alcohol, Isopropyl	TT-I-735
4	Brush, Nonmetallic	MIL-B-43871
5	Wire, Electrical, White, AWG No. 22	MIL-W-16878
6	Sandpaper	NO. 0000

1–4 REFERENCED DOCUMENTS

The following USAF technical manuals are referenced in this manual

T.O. 00-25-195 Source Maintenance and Recoverability Coding of Air Force Weapons Systems and Equipment

T.O. 00-25-234 General Shop Practice Requirements for the Repair, Maintenance and Test of Electronic Equipment

T.O. 1-1-691 Aircraft Weapons System, Cleaning and Corrosion Control

1–5 WARRANTY INFORMATION

COMSPACE warrants products against defects in material and workmanship for 90 days from the date of original shipment. Liability is limited to the repair or replacement of products which prove to be defective during the warranty period. There is no charge under the warranty except for transportation charges. The purchaser shall be responsible for products shipped until received by

CHAPTER 2
PREPARATION FOR USE, SHIPMENT AND STORAGE

2–1 SCOPE

This chapter provides the necessary instructions to prepare the battery tester for use, shipment and storage.

2–2 PREPARATION FOR USE

a. Upon receipt of battery tester, carefully remove from shipping container. Save container for future use.

b. Inspect battery tester in accordance with table 5-1.

c. Check operation of battery tester load resistors. Refer to paragraph 5-4.

2–3 PREPARATION FOR SHIPMENT

Refer to USAF T.O. 00-25-234 for shipment procedures.

2–4 PREPARATION FOR STORAGE

Refer to USAF T.O. 00-25-234 for storage procedures.

CHAPTER 3
THEORY OF OPERATION

3–1 SCOPE

This chapter provides theory of operation of the battery tester. The theory of operation is provided as an aid to maintenance personnel during troubleshooting.

3–2 THEORY OF OPERATION

3-2.1 Voltmeter Circuit. The battery tester contains a 0 to 1 milliampere meter and is used in conjunction with a set of series connected multiplier resistors. The resistance of the movement is 100 ohms and the sensitivity of the meter is 1000 ohms per volt. See figure 3-1.

3-2.2 Circuit Switching. Circuit switching is accomplished between the voltmeter ranges and the load resistors by the use of a selector plug and 32 jacks. The cord of the positive test probe is internally connected to the tip and ring of the selector plug. By inserting the plug into any one of the 32 jacks, the positive terminal of a battery being tested is connected, first to one side of a load resistor and then to one of the junctions between the series-connected multiplier resistors. The other side of the load resistor is connected to a line common to one side of all the load resistors. The common line is connected through the NO LOAD/TEST LOAD switch to the negative probe. When the negative probe is applied to the negative battery terminal the circuit is complete. See figure 5-1.

CHAPTER 4
OPERATION

4–1 SCOPE

This chapter provides a description of the battery tester controls and indicators as well as operating procedures.

4–2 CONTROLS AND INDICATORS

The battery tester controls and indicators are shown in figure 4-1. Each control or indicator is indexed and an explanation of each is found in table 4-1.

Table 4-1 Controls and Indicators

Index No.	Control or Indicator	Function
1	Voltmeter	Used to display voltage reading of battery being tested. The meter has four voltage scales: 0-2, 0-10, 0-50 and 0-200 volts.
2	Jacks No. 1-4	Color coded black, jacks 1-4 are used to measure batteries with a voltage range of 0-2 VDC.
3	Jacks No. 5-10	Color coded green, jacks 5-10 are used to measure batteries with a voltage range of 0-10 VDC.
4	Jacks No. 11-20	Color coded yellow, jacks 11-20 are used to measure batteries with a voltage range of 0-50 VDC.
5	Jacks No. 21-32	Color coded red, jacks 21-32 are used to measure batteries with a voltage range of 0-200 VDC.
6	Selector Plug	Inserted during test into the jack selected by the operator to test the battery.
7	Positive test probe	Used during test to connect positve side of battery to battery tester circuit.
8	Negative test probe	Used during testing to connect negative side of battery to battery circuit.
9	NO LOAD/TEST LOAD switch	Normally in TEST LOAD position. Used to check function of load resistor when moved to NO LOAD position.
10	Zero Adjust Screw	Used to zero voltmeter pointer.

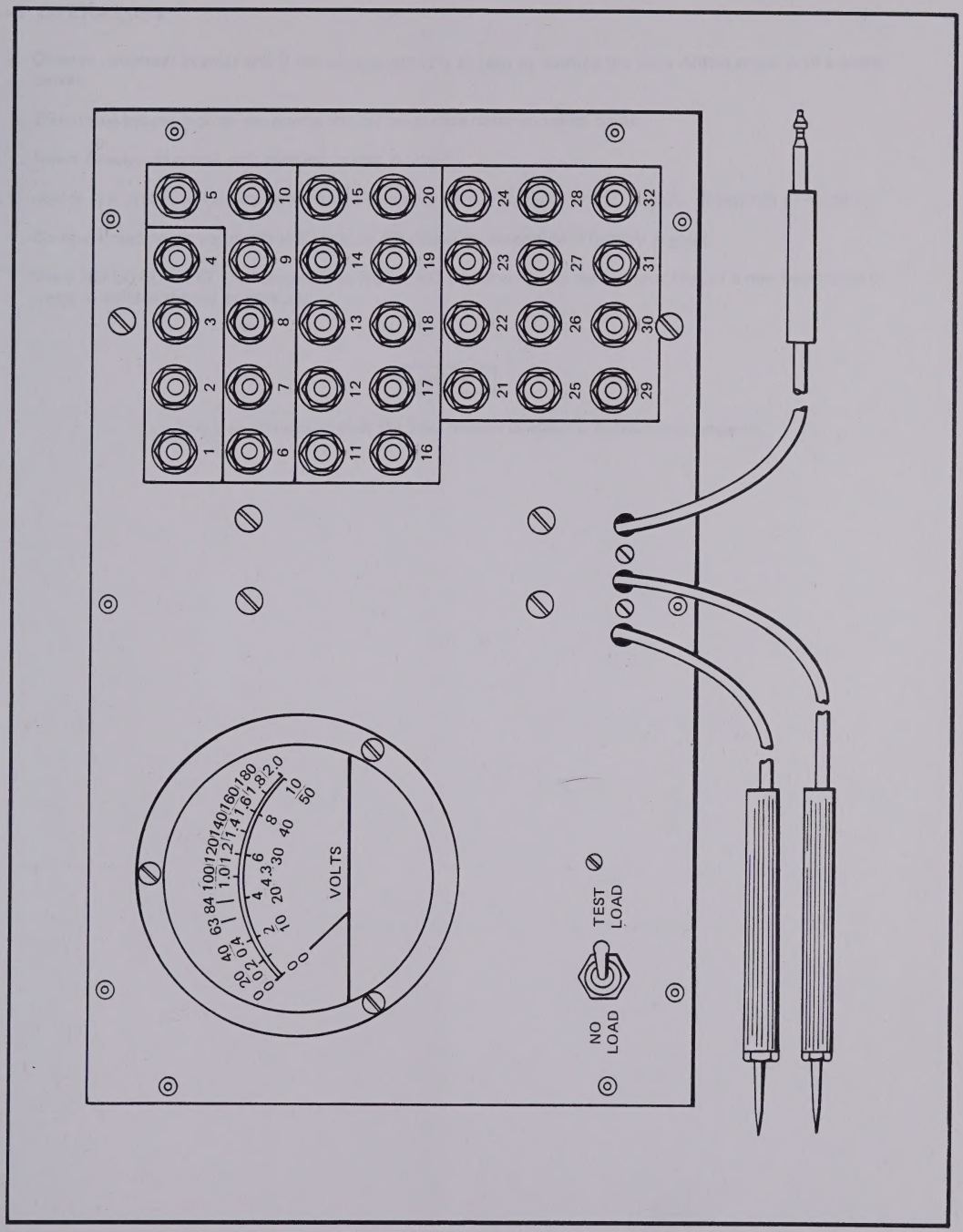


Figure 4-1 Control Panel Controls and Indicators

4–3 OPERATION

a. Observe voltmeter pointer and if not at zero adjust it to zero by turning the Zero Adjust screw with a screw driver.

b. Determine proper jack to use during test by using data chart on inside cover.

c. Insert selector plug into jack selected in step b above.

d. Apply test probes to battery terminals. Ensure polarity is correct. Do not exceed 15 seconds of contact.

e. Compare reading on voltmeter with that of data chart to determine if battery is good.

f. Move NO LOAD/TEST LOAD switch to NO LOAD position. In all tests except that of a new battery an increase in voltage should be detected.

NOTE

This is an indication that the load resistor selected is functioning properly.

CHAPTER 5
MAINTENANCE

5–1 SCOPE

This chapter provides instructions for preventive and corrective maintenance. Preventive maintenance consists of periodic inspection and cleaning of the battery tester. Corrective maintenance consists of repair by removal and replacement of the defective part, troubleshooting and performance verification after repair is complete.

5–2 PREVENTIVE MAINTENANCE

Refer to table 5-1 for perodic inspection procedure and table 5-2 for cleaning procedures.

5-2.1 Inspection. Refer to table 5-1 for battery tester inspection procedure.

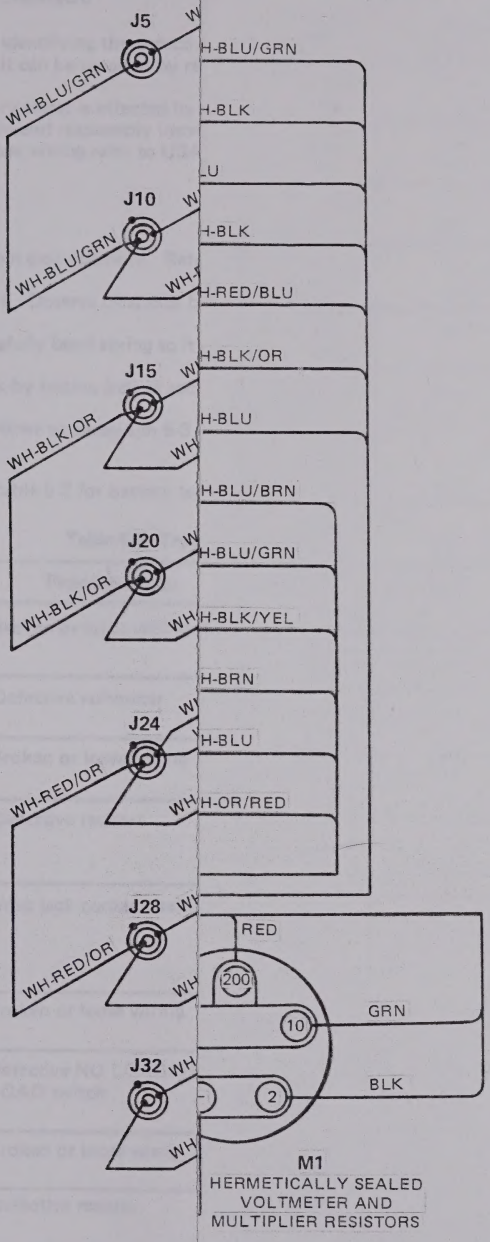
Table 5-1 Inspection Procedures

Item	Frequency	Inspect For
Voltmeter	Weekly	Security of attaching hardware cracked meter glass. Check hermetical seal for cracks or looseness.
NO LOAD/ TEST LOAD switch	Weekly	Check for proper operation. Switch is normally set in TEST LOAD position. Switch should spring back to TEST LOAD position from NO LOAD position.
Jack Selector Plug Test Probes	Weekly	Dirt and corrosion on contact surfaces. Cables broken or frayed insulation. Loosen and slide back insulation sleeves and check soldered connections.
Case and Operating Panel	Weekly	Check for dents, cracks, scratches or other physical damage, loose or missing attaching hardware, hinges, handle and catches. Check condition of gasket on case.
Internal Wiring	Weekly	Frayed, broken, or abraded insulation, broken, corroded or poorly soldered connections.
Resistors	Monthly	Cracked, blistered or charred body, and broken or corroded leads.

5-2.2 Cleaning. Refer to table 5-2 for procedures. In parenthesis refer to items listed in table 1-2.

Table 5-2 Cleaning Procedures

Item	Frequency	Cleaning Procedure
Case, Operating Panel, Test Probes, Selector Plug, Jacks, Voltmeter glass	As required	**WARNING** Dry cleaning solvent is toxic to skin, eyes, and respiratory tract. Skin and eye protection required. Avoid repeated or prolonged contact. Good general ventilation is normally adequate. **CAUTION** Isopropyl alcohol is flammable and toxic to eyes, skin, and respiratory tract. Skin and eye protection required. Avoid repeated or prolonded contact. Good general ventilation is normally adequate. (1) Remove grease, oil, and dirt with soft-bristled, non-metallic brush (4) moistened with dry cleaning solvent (2). (2) Remove solvent film with clean lint free cloth (1) moistened with isopropyl alcohol (3).
Contact surfaces of jacks, selector plug and test probes	Weekly	(1) Remove dirt and corrosion with sandpaper (6). **WARNING** Compressed air used for cleaning can create airborne particles that may enter the eyes. Pressure will not exceed 30 psig. Eye protection is required. (2) Dust with air jet and soft-bristled, non-metallic brush (4). **WARNING** Dry cleaning solvent is toxic to skin, eyes, and respiratory tract. Skin and eye protection required. Avoid repeated or prolonged contact. Good general ventilation is normally adequate. (3) Moisten a clean lint free cloth (1) with isopropyl alcohol (3) and clean off contact surfaces.
Internal Wiring and resistors	As required	**WARNING** Compressed air used for cleaning can create airborne particles that may enter the eyes. Pressure will not exceed 30 psig. Eye protection is required. Dust with air jet and soft-bristled, non-metallic brush (4).



5-1 Battery Tester Wiring Diagram

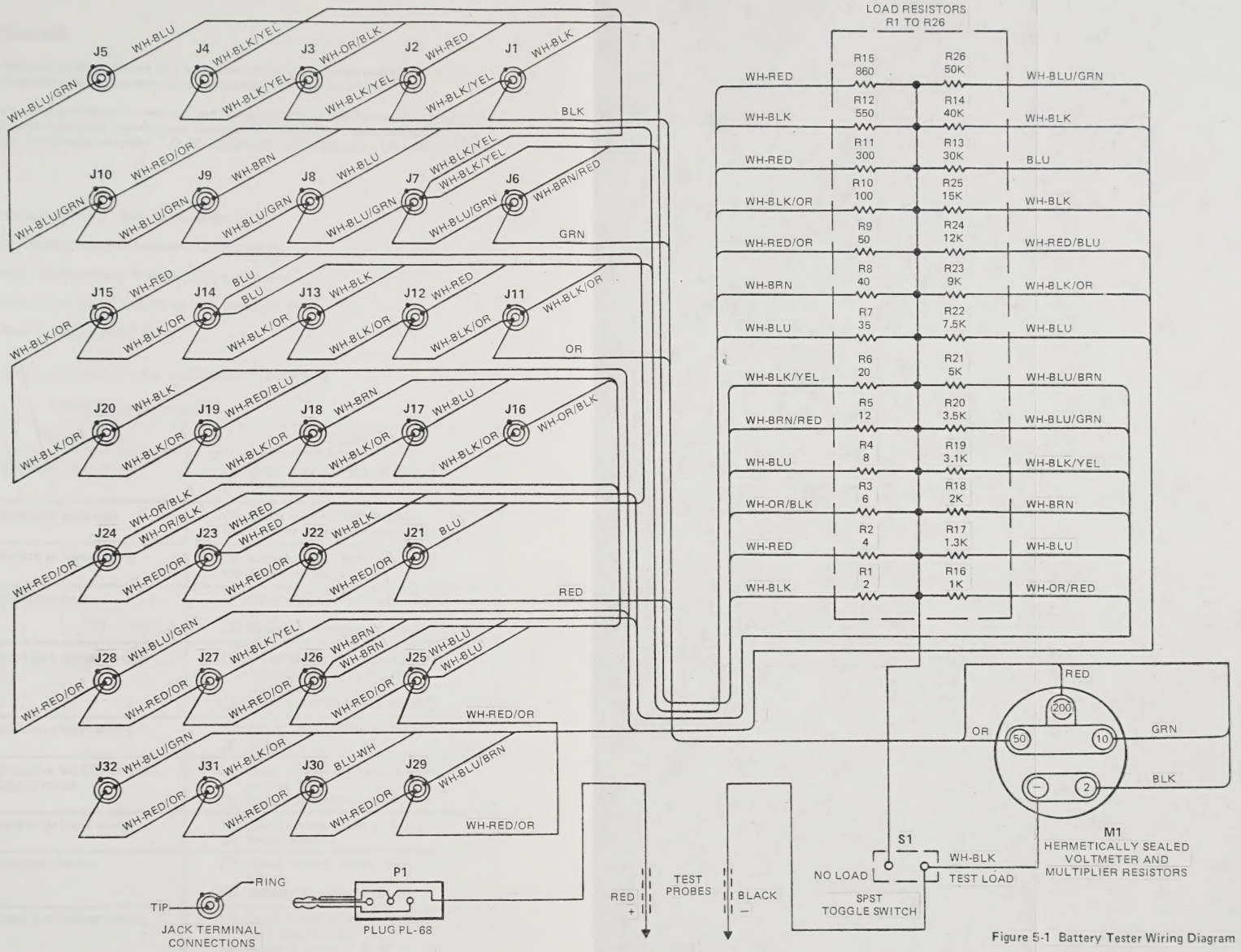


Figure 5-1 Battery Tester Wiring Diagram

5–3 CORRECTIVE MAINTENANCE

Corrective maintenace consists of identifying the defective part by inspection and or troubleshooting. Once the defective part has been identified it can be repaired by rewiring or removing and replacing the part.

5-3.1 Repair. Repair of the battery tester is effected by removal and replacement of the defective part. Paragraphs 5-3.3 and 5-3.4 provide disassembly and reassembly instructions. Disassemble the battery tester only to the extent necessary to effect repairs. To repair wiring refer to USAF T.O. 00-25-234 and wiring diagram of the battery tester figure 5-1.

5-3.1.1 Jack Spring Adjustment.

a. Remove operating panel from case assembly. Refer to paragraph 5-3.3.

b. Insert selector plug into jack. Observe clearance between plug and spring.

c. Using a long nose pliers carefully bend spring so it makes contact with plug.

d. Check out operation of jack by testing jack in accordance with paragraph 5-4.

e. Reinstall operating panel. Refer to paragraph 5-3.4.

5-3.2 Troubleshooting. Refer to table 5-3 for battery tester troubleshooting procedures.

Table 5-3 Troubleshooting

Symptom	Probable Cause	Remedy
1. Voltmeter fails to operate for all plug positions.	a. Broken or loose wiring	(1) Check wiring. Refer to figure 5-1. (2) Repair wiring.
	b. Defective voltmeter	(1) Check condition of voltmeter. (2) Remove and replace as required.
2. Voltmeter fails to operate for one or more plug positions.	a. Broken or loose wiring	(1) Check wiring. Refer to figure 5-1. (2) Repair wiring.
	b. Defective resistor	(1) Check resistor. Refer to paragraph 5-4. (2) Remove and replace as required.
	c. Weak jack contact spring	(1) Check spring for proper contact with selector plug. Refer to paragraph 5-3.1.1. (2) Remove and replace as required.
3. All load resistors have no loading effect.	a. Broken or loose wiring	(1) Check wiring. Refer to figure 5-1. (2) Repair wiring.
	b. Defective NO LOAD/TEST LOAD switch	(1) Check operation of switch. Refer to table 5-1. (2) Remove and replace as required.
4. One individual load resistor has no loading effect.	a. Broken or loose wirng	(1) Check wiring. Refer to figure 5-1. (2) Repair wiring.
	b. Defective resistor	(1) Check resistor. Refer to paragraph 5-4. (2) Remove and replace resistor.
	c. Weak jack contact spring	(1) Check spring for proper contact with selector plug. (2) Adjust if required. Refer to paragraph 5-3.1.1.

5-3.3 Disassembly. Disassembly procedures are keyed to index numbers on figures in the IPB. To disassemble battery tester refer to the below paragraphs. Disassemble only to extent necessary to effect repairs.

5-3.3.1 Removal of Panel Assembly. See figure 6-1 and proceed as follows:

a. Remove eight screws (2) securing panel assembly (1) to case (3).

b. Carefully remove panel assembly from case.

5-3.3.2 Disassembly of Panel Assembly. See figure 6-2 and proceed as follows:

a. Removal of Voltmeter (1).

(1) Remove and tag voltmeter wiring.

(2) Remove three screws (2), nuts (3) and washers (4) securing voltmeter to panel (151).

(3) Remove voltmeter.

b. Removal of NO LOAD/TEST LOAD switch (5).

(1) Remove and tag switch wiring.

(2) Remove one nut (6) securing switch to panel (151). Remove switch.

c. Removal of Red Test Probe (8) and Selector Plug (9).

(1) Remove selector plug housing and remove wiring from plug (9).

(2) Pull test probe out through two holes in panel (151).

d. Removal of Black Test Probe (10).

(1) Remove test probe wiring from switch (5).

(2) Remove screw (11) securing wire clip (12) to panel (151) and then remove test probe.

e. Removal of Resistor Bracket Assembly (14).

NOTE

Removal of resistor bracket assembly should be done to gain access to jack wiring or to remove and replace a jack. Remove resistors individually without removing bracket if a resistor needs replacement.

(1) Remove two screws (15), nuts (16) and blocks (17) securing bracket assembly to panel (151).

(2) Remove bracket assembly.

f. Removal of Resistor(s) R1-12 and R15-20.

NOTE

Removal of these resistors is identical. Only the removal of R1 is presented here.

(1) Remove wiring from resistor R1 (18).

(2) Remove one screw (19), washer (20), nut (21) shoulder washer (22) and self-locking nut (23) securing resistor to bracket (14).

g. Removal of Resistor R21 (126).

(1) Remove wiring from resistor.

(2) Remove one screw (127) and nut (128) securing resistor to bracket.

h. Removal of Resistor R22 (129)

(1) Remove wiring from resistor.

(2) Remove one screw (130) and nut (131) securing resistor to bracket.

i. Removal of Resistor R23 (132).

(1) Remove wiring from resistor.

(2) Remove one screw (133) and nut (134) securing resistor to bracket.

j. Removal of Terminal Board (140).

(1) Remove wiring to terminal board.

(2) Remove two screws (141) and self-locking nuts (142) securing board to bracket. Remove board.

(3) Remove resistors R13, R14, R24, R25, R26 in accordance with USAF T.O. 00-25-234.

k. Removal of Jack(s) J1-J32 (148).

(1) Remove resistor bracket assembly (14) to gain access to jack. Refer to step e above.

(2) Remove wiring to jack.

(3) Remove one nut (149) and washer (150) securing jack to panel (151).

5-3.3.3 Disassembly of Case Assembly. Disassembly of Case Assembly is obvious upon examination. Disassemble in accordance with general shop procedures. See figure 6-3.

5-3.4 Reassembly. Reassembly procedures are keyed to index numbers in the IPB. To reassemble the battery tester after repair, refer to the below paragraphs.

5-3.4.1 Reassembly of Panel Assembly. See figure 6-2 and proceed as follows:

a. Installation of Jack(s) J1-J32 (148).

(1) Position jack (148) in proper position on panel (151).

(2) Secure to panel with one washer (150) and nut (149).

(3) Wire jack. Refer to figure 5-1.

b. Installation of Terminal Board (140).

(1) If applicable wire resistors R13, R14, R24, R25 and R26 to board in accordance with USAF T.O. 00-25-234.

(2) Position terminal board on bracket and secure with two screws (141) and nuts (142).

c. Installation of Resistor R23 (132).

(1) Position resistor on bracket and secure with one screw (133) and nut (134).

(2) Connect resistor wiring. Refer to figure 5-1.

d. Installation of Resistor R22 (129).

(1) Position resistor on bracket and secure with one screw (130) and nut (131).

(2) Connect resistor wiring. Refer to figure 5-1.

e. Installation of Resistor R21 (126).

(1) Position resistor on bracket and secure with one screw (127) and nut (128).

(2) Connect resistor wiring. Refer to figure 5-1.

f. Installation of Resistor(s) R1-R12 and R15-R20.

NOTE

Installation of these resistors is identical. Only the installation of R1 is presented here.

(1) Position resistor on bracket (14) and secure with one screw (19), washer (20), nut (21), shoulder washer (22) and self-locking nut (23).

(2) Connect resistor wiring. Refer to figure 5-1.

g. Installation of Resistor Bracket (14).

(1) Position resistor bracket in proper position on panel (151).

(2) Secure bracket to panel with two screws (15), nuts (16) and blocks (17).

h. Installation of Black Test Probe (10).

(1) Pass probe cable through hole in panel (151).

(2) Wire probe to NO LOAD/TEST LOAD switch. Refer to figure 5-1.

(3) Secure probe cable to panel with one screw (11), wire clip (12) and nut (13).

i. Installation of Red Test Probe (8) and Selector Plug (9).

(1) Remove plug housing.

(2) Pass plug end of cable down through middle hole in panel and up through right hole. Ensure there is enough slack in selector plug cable to reach all jacks.

(3) Reattach plug housing.

j. Installation of NO LOAD/TEST LOAD Switch (5).

(1) Position switch on panel with one nut (6) and washer (7) on switch threads and then secure to panel with one nut (6).

(2) Wire switch. Refer to figure 5-1.

k. Installation of Voltmeter (1).

(1) Position voltmeter on panel (151) and secure with three screws (2), nuts (3) and washers (4).

(2) Wire voltmeter. Refer to figure 5-1.

5-3.4.2 **Reassembly of Case Assembly.** Reassembly of Case Assembly is obvious upon examination. Reassemble in accordance with general shop practices. See figure 6-3.

5-3.4.3 **Reassembly of Battery Tester.** See figure 6-1 and proceed as follows:

(1) Insert panel assembly (1) into case assembly (3).

(2) Secure panel assembly with eight screws (2).

5–4 PERFORMANCE VERIFICATION

Performance verification for the battery tester consists of checking the operation of the load resistors. This is done by connecting an ohmmeter between the test probes and by inserting the selector plug into each of the 32 jacks; the value of each resistor may be measured. The measured values can then be checked against the values shown in table 5-3.

Table 5-3 Resistor Load Measurement Values

Jack No.	Voltage Range	Resistance	Jack No.	Voltage Range	Resistance
1	0-2	1.998 ±1%	17	0-50	2919.0 ±5%
2	0-2	3.991 ±1%	18	0-50	3271.4 ±5%
3	0-2	5.983 ±1%	19	0-50	18,750.0 ±5%
4	0-2	19.800 ±1%	20	0-50	22,220.0 ±5%
5	0-10	7.995 ±1%	21	0-200	856.2
6	0-10	11.990 ±1%	22	0-200	995.0
7	0-10	19.950 ±1%	23	0-200	1292.0
8	0-10	34.880 ±1%	24	0-200	1980.0
9	0-10	39.850 ±1%	25	0-200	3053.0
10	0-10	49.750 ±1%	26	0-200	3440.0
11	0-50	99.800 ±1%	27	0-200	4879.0
12	0-50	298.200 ±1%	28	0-200	7230.0
13	0-50	544.000 ±1%	29	0-200	8648.0
14	0-50	845.400 ±5%	30	0-200	11,320.0
15	0-50	1267.000 ±5%	31	0-200	13,995.0
16	0-50	1923.000 ±5%	32	0-200	40,000.0

CHAPTER 6
ILLUSTRATED PARTS BREAKDOWN

Section A INTRODUCTION

6–1 SCOPE

The Illustrated Parts Breakdown (IPB) is divided into two sections: Introduction and Maintenance Parts List (MPL). The Introduction explains how to use the IPB with an explanation of each column in the MPL, a list of CAGE codes, symbols and abbreviations and SMR codes.

6–2 MAINTENANCE PARTS LIST EXPLANATION

The MPL contains a breakdown of the battery tester into its major assemblies, subassemblies, detail parts, and attaching parts that are considered to have maintenance significance.

6-2.1 Figure, Index Number Column. This column provides the figure and index numbers used to key a part or the assembly listed in the MPL to its location in the illustration. The index number are arranged in numerical order and used to determine the exact location for each part and to allow for cross referencing between the illustration and the parts list.

6-2.2 SMR Code Column. This column contains source, maintenance and recoverability (SMR) codes. Definitions of these codes are available in USAF T.O. 00-25-195. In this manual the SMR code column is left blank until the appropriate code is assigned by the authorizing USAF activity.

6-2.3 CAGE Code Column. Commercial and Government Entity (CAGE) codes are entered in this column. Each vendor with an assigned code is listed in Federal Cataloging Handbook H4-1, H4-2, and H4-3 that is the manufacturer of the part listed is listed in this column.

6-2.4 Part Number Column. This column provides the manufacture's part number for each part in the listing. Attaching parts that are not of special design such as nuts, bolts, washers, screws, etc, and are obtainable from a wide range of sources are identified by a part number or the notation "commercial" instead of the part number.

6-2.5 Description Column. The description is assigned according to the nomenclature placed in the title block of the design activity's engineering drawing.

6-2.6 Quantity Column. This column lists the number of units required per assembly or subassembly. Quantities specified in this column are not necessarily the total quantities used per end item. Where items have been previously listed, or are listed for reference purposes, the letters REF are used. The letters AR denote as required when quantities cannot be specifically determined.

6–3 SYMBOLS AND ABBREVIATIONS

Symbols and abbreviations used in this IPB are listed below:

AP	Attaching Parts
AR	As Required
CAGE	Commercial and Government Entity
REF	Reference
NHA	Next Higher Assembly
P/O	Part Of - Used when attaching parts are supplied with item.

6–4 CAGE CODE LIST

The following is a list of CAGE codes used in the MPL with each manufacturers name and address.

Code	Manufactures Name and Address
32677	COMSPACE 243 Dixon Ave. Amityville, N.Y. 11701
81349	Military Specifications Promulgated by Military Departments/Agencies Under Authority of Defense Standardization Manual 41203-M
96906	Military Standards Promulgated by Military Departments/Agencies Under Authority of Defense Standardization Manual 41203-M

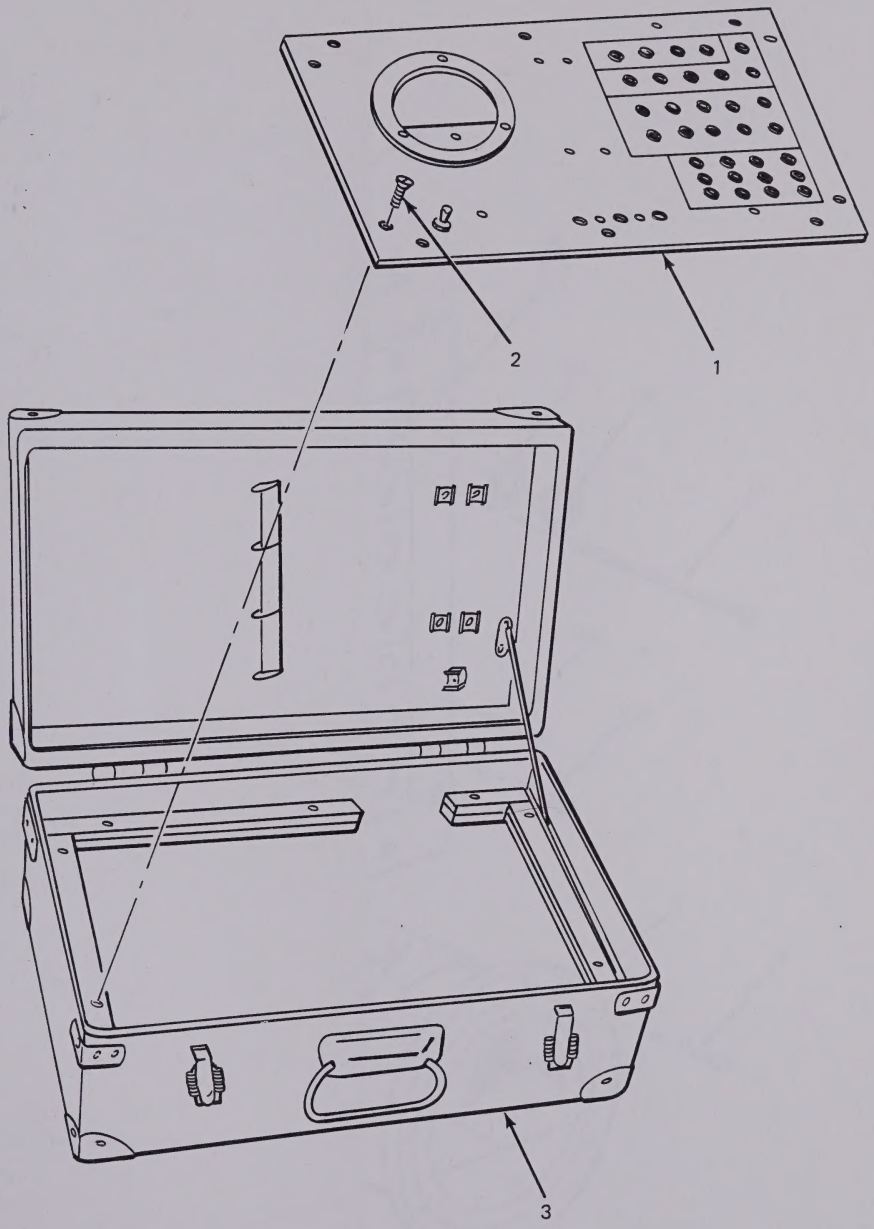
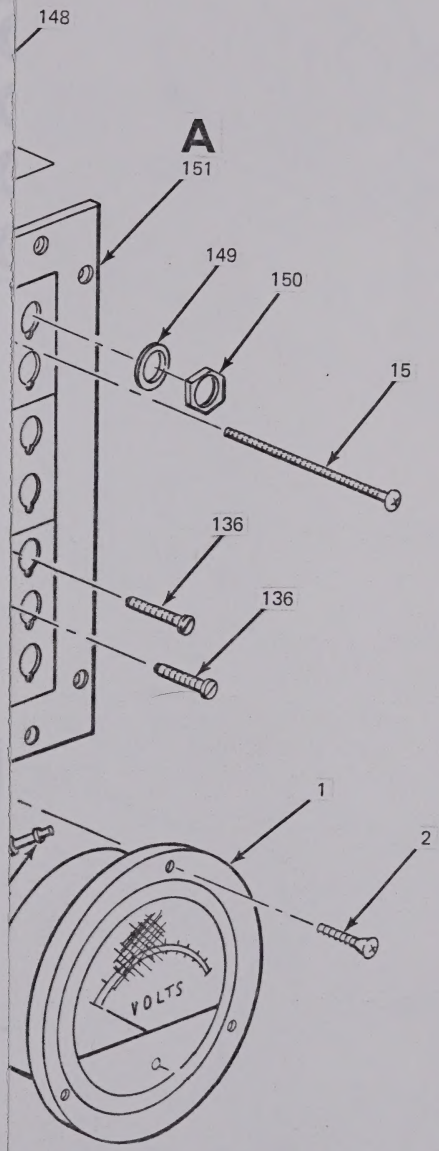


Figure 6-1 Battery Tester Exploded View



Panel Assembly Exploded View
(Sheet 1 of 4)

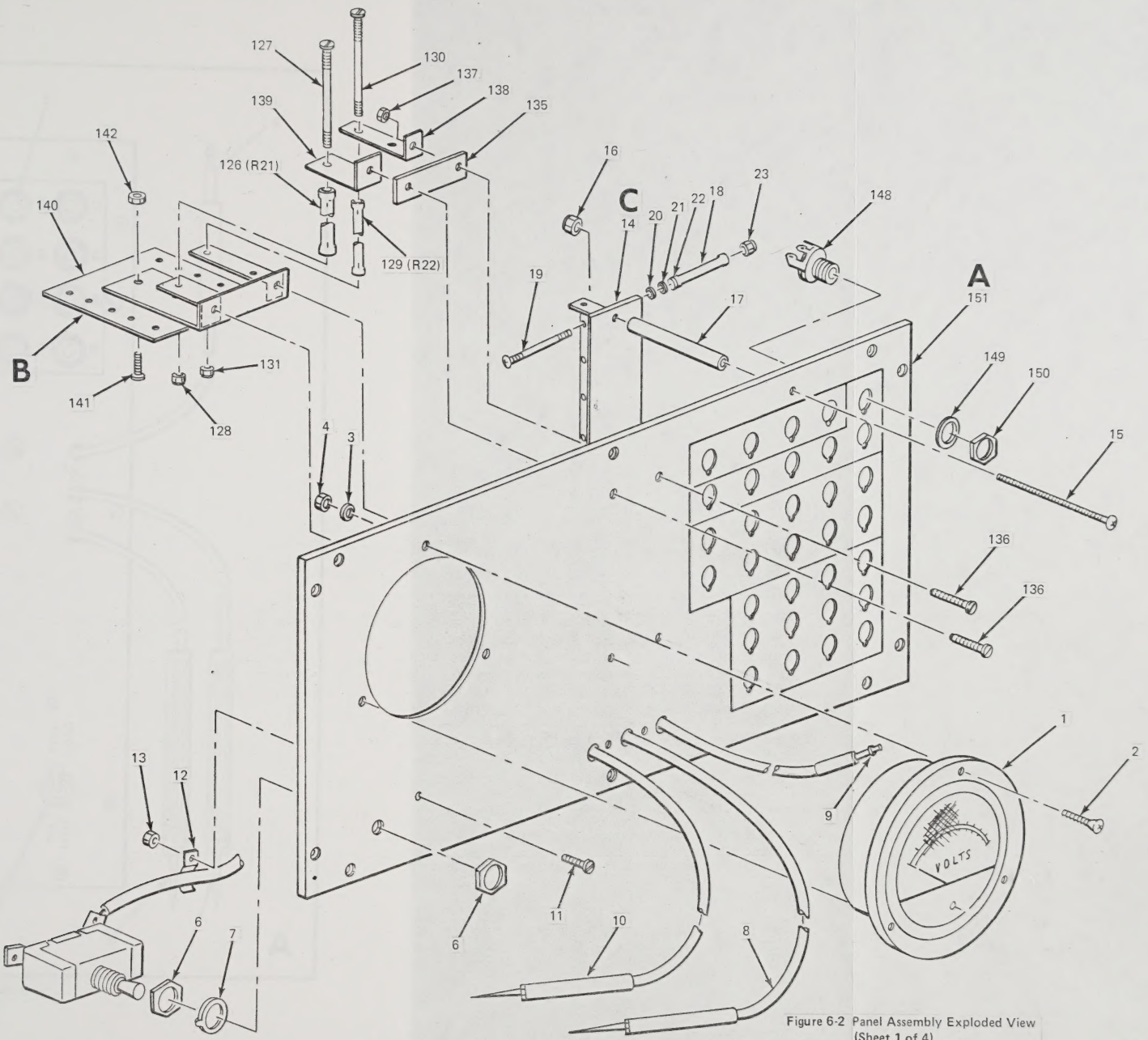


Figure 6-2 Panel Assembly Exploded View (Sheet 1 of 4)

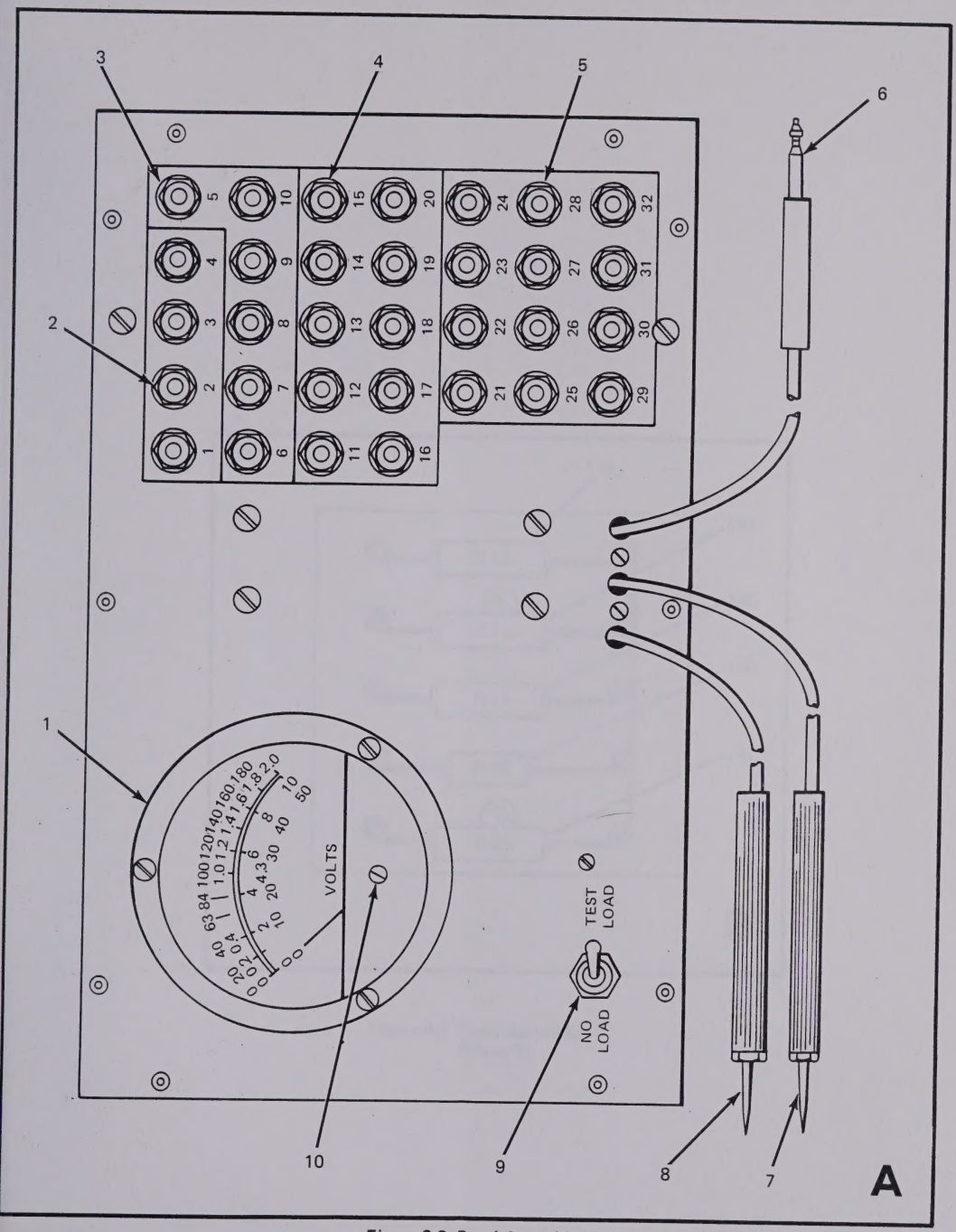


Figure 6-2 Panel Assembly
(Sheet 2)

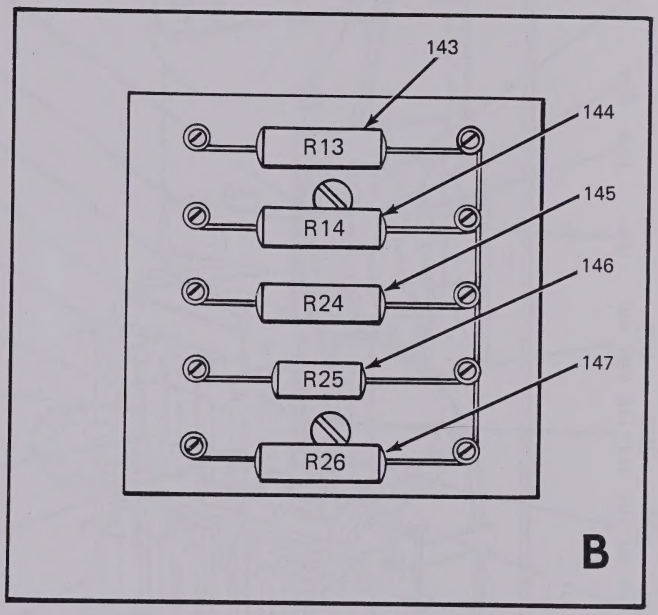


Figure 6-2 Panel Assembly (Sheet 3)

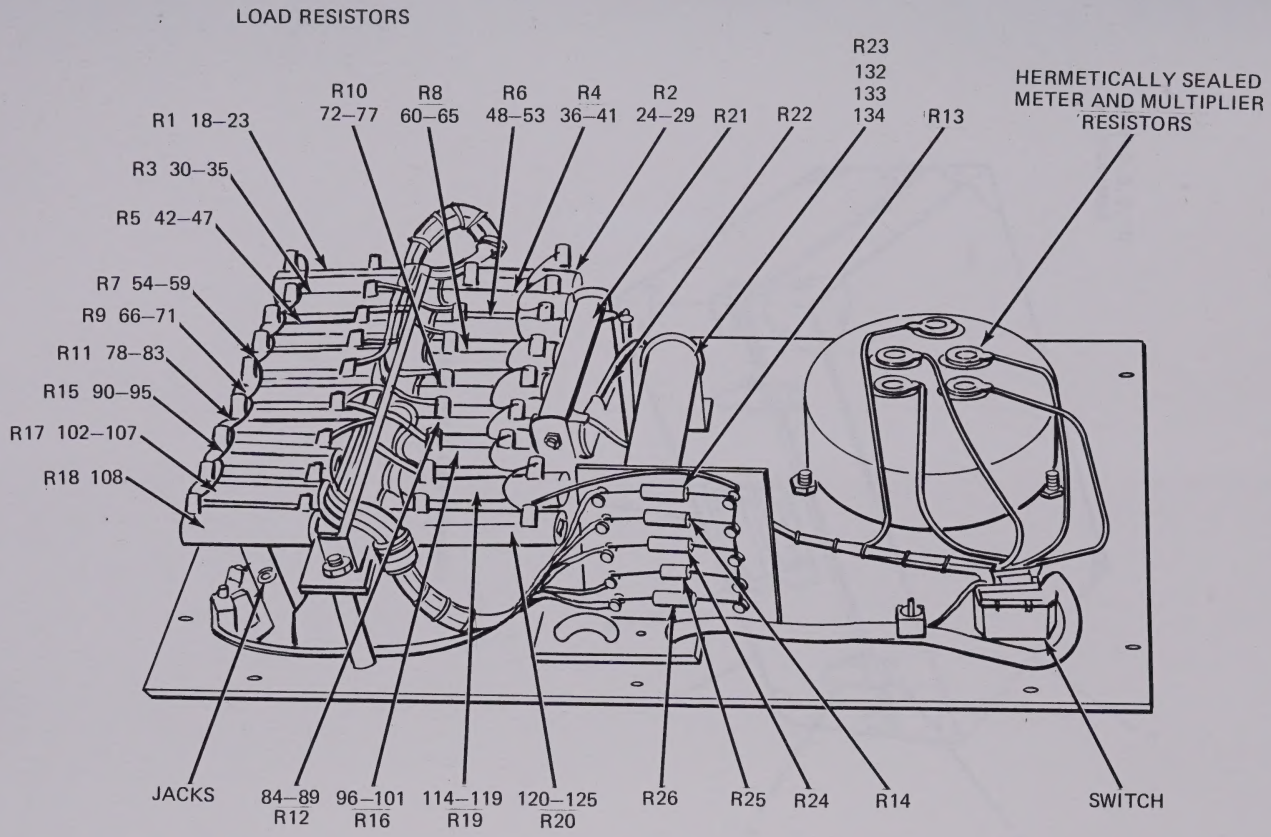


Figure 6-2 Panel Assembly (Sheet 4)

C

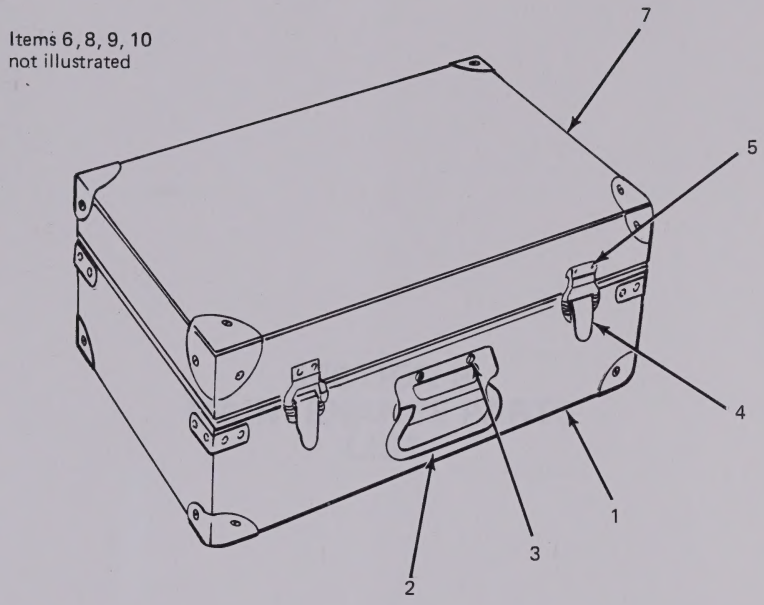


Figure 6-3 Case Assembly

SECTION B
MAINTENANCE PARTS LIST

Figure/ Index No.	SMR Code	CAGE Code	Part Number	Description	Qty
6-1		32677	TS-183B/U	Battery Tester	REF
-1		32677	SC-D-86015	• Panel Assembly (See figure 6-2 for Breakdown)	1
-2		96906	Commercial	• Screw (AP)	8
-3		32677	SC-D-86007	• Case Assembly (See figure 6-3 for Breakdown)	1

Figure/ Index No.	SMR Code	CAGE Code	Part Number	Description	Qty
6-2		32677	SC-D-86015	Panel Assembly (See figure 6-1 for NHA)	REF
-1		81349	SC-D-86015-1	• Voltmeter	1
-2		96906	P/O SC-D-86015-1	• Screw (AP)	3
-3		96906	P/O SC-D-86015-1	• Washer (AP)	3
-4		96906	P/O SC-D-86015-1	• Nut (AP)	3
-5		81349	SC-D-86015-6	• Switch NO LOAD/ TEST LOAD, SPDT, Type ST	1
-6		96906	P/O SC-D-86015-6	• Nut (AP)	2
-7		96906	P/O SC-D-86015-6	• Washer (AP)	1
-8		81349	SC-B-86017-1	• Probe Assembly, Red	1
-9		81349	JAN-P-642	• Plug	1
-10		81349	SC-D-86017-2	• Probe Assembly, Black	1
-11		96906	Commercial	• Screw (AP)	1
-12		96906	SC-D-86015-3	• Clip, Wire (AP)	1
-13		96906	Commercial	• Nut (AP)	1
-14		32677	SC-C-86021	• Bracket Assembly, Resistor (See Detail A for breakdown)	1
-15		96906	Commercial	• Screw (AP)	2
-16		96906	Commercial	• Nut (AP)	2
-17		96906	SC-B-86023	• Block (AP)	2
-18		81349	RW31G2R0	•• Resistor (R1), Fixed WW, 2 Ohms, ±1%, 10W	1
-19		96906	Commercial	•• Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-20		96906	Commercial	•• Washer, Internal Tooth, No. 8 (AP)	1
-21		96906	Commercial	•• Nut, 6/32, NC2 (AP)	1
-22		96906	Commercial	•• Washer, Shoulder, No. 8 (AP)	1
-23		96906	Commercial	•• Nut, Self-Locking No. 8 (AP)	1
-24		81349	RW31G4R0	•• Resistor (R2), Fixed WW, 4 Ohms ±1%, 10W	1

Figure/ Index No.	SMR Code	CAGE Code	Part Number	Description	Qty
-25		96906	Commercial	•• Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-26		96906	Commercial	•• Washer, Internal Tooth, No. 8 (AP)	1
-27		96906	Commercial	•• Nut, 6/32, NC2 (AP)	1
-28		96906	Commercial	•• Washer, Shoulder, No. 8 (AP)	1
-29		96906	Commercial	•• Nut, Self-Locking No. 8 (AP)	1
-30		81349	RW31G6R0	•• Resistor, (R3), Fixed WW, 6 Ohms ±1%, 10W	1
-31		96906	Commercial	•• Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-32		96906	Commercial	•• Washer, Internal Tooth, No. 8 (AP)	1
-33		96906	Commercial	•• Nut, 6/32, NC2 (AP)	1
-34		96906	Commercial	•• Washer, Shoulder, No. 8 (AP)	1
-35		96906	Commercial	•• Nut, Self-Locking No. 8 (AP)	1
-36		81349	RW31G8R0	•• Resistor, (R4), Fixed WW, 8 Ohms ±1%, 10W	1
-37		96906	Commercial	•• Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-38		96906	Commercial	•• Washer, Internal Tooth, No. 8 (AP)	1
-39		96906	Commercial	•• Nut, 6/32, NC2 (AP)	1
-40		96906	Commercial	•• Washer, Shoulder, No. 8 (AP)	1
-41		96906	Commercial	•• Nut, Self-Locking No. 8 (AP)	1
-42		81349	RW31G120	•• Resistor, (R5), Fixed WW, 12 Ohms ±1%, 10W	1
-43		96906	Commercial	•• Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-44		96906	Commercial	•• Washer, Internal Tooth, No. 8 (AP)	1
-45		96906	Commercial	•• Nut, 6/32, NC2 (AP)	1

Figure/ Index No.	SMR Code	CAGE Code	Part Number	Description	Qty
-46		96906	Commercial	•• Washer, Shoulder, No. 8 (AP)	1
-47		96906	Commercial	•• Nut, Self-Locking No. 8 (AP)	1
-48		81349	RW31G200	•• Resistor (R6), Fixed WW, 20 Ohms ±1%, 10W	1
-49		96906	Commercial	•• Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-50		96906	Commercial	•• Washer, Internal Tooth, No. 8 (AP)	1
-51		96906	Commercial	•• Nut, 6/32, NC2 (AP)	1
-52		96906	Commercial	•• Washer, Shoulder, No. 8 (AP)	1
-53		96906	Commercial	•• Nut, Self-Locking No. 8 (AP)	1
-54		81349	RW31G350	•• Resistor (R7), Fixed WW, 35 OHMS ±1%, 10W	1
-55		96906	Commercial	•• Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-56		96906	Commercial	•• Washer, Internal Tooth, No. 8 (AP)	1
-57		96906	Commercial	•• Nut, 6/32, NC2 (AP)	1
-58		96906	Commercial	•• Washer, Shoulder, No. 8 (AP)	1
-59		96906	Commercial	•• Nut, Self-Locking No. 8 (AP)	1
-60		81349	RW31G400	•• Resistor (R8), Fixed WW, 40 Ohms ±1%, 10W	1
-61		96906	Commercial	•• Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-62		96906	Commercial	•• Washer, Internal Tooth, No. 8 (AP)	1
-63		96906	Commercial	•• Nut, 6/32, NC2 (AP)	1
-64		96906	Commercial	•• Washer, Shoulder, No. 8 (AP)	1
-65		96906	Commercial	•• Nut, Self-Locking No. 8 (AP)	1

Figure/ Index No.	SMR Code	CAGE Code	Part Number	Description	Qty
-66		81349	RW31G500	●● Resistor, (R9), Fixed WW, 50 Ohms ±1%, 10W	1
-67		96906	Commercial	●● Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-68		96906	Commercial	●● Washer, Internal Tooth, No. 8 (AP)	1
-69		96906	Commercial	●● Nut, 6/32, NC2 (AP)	1
-70		96906	Commercial	●● Washer, Shoulder, No. 8 (AP)	1
-71		96906	Commercial	●● Nut, Self-Locking No. 8 (AP)	1
-72		81349	RW31G101	●● Resistor, (R10), Fixed WW, 100 Ohms ±1%, 10W	1
-73		96906	Commercial	●● Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-74		96906	Commercial	●● Washer, Internal Tooth, No. 8 (AP)	1
-75		96906	Commercial	●● Nut, 6/32, NC2 (AP)	1
-76		96906	Commercial	●● Washer, Shoulder, No. 8 (AP)	1
-77		96906	Commercial	●● Nut, Self-Locking No. 8 (AP)	1
-78		81349	RW31G301	●● Resistor, (R11), Fixed WW, 300 Ohms ±1%, 10W	1
-79		96906	Commercial	●● Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-80		96906	Commercial	●● Washer, Internal Tooth, No. 8 (AP)	1
-81		96906	Commercial	●● Nut, 6/32, NC2 (AP)	1
-82		96906	Commercial	●● Washer, Shoulder, No. 8 (AP)	1
-83		96906	Commercial	●● Nut, Self-Locking No. 8 (AP)	1

Figure/ Index No.	SMR Code	CAGE Code	Part Number	Description	Qty
-84		81349	RW31G551	●● Resistor (R12), Fixed WW, 550 Ohms ±1%, 10W	1
-85		96906	Commercial	●● Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-86		96906	Commercial	●● Washer, Internal Tooth, No. 8 (AP)	1
-87		96906	Commercial	●● Nut, 6/32, NC2 (AP)	1
-88		96906	Commercial	●● Washer, Shoulder, No. 8 (AP)	1
-89		96906	Commercial	●● Nut, Self-Locking No. 8 (AP)	1
-90		81349	RW31G861	●● Resistor (R15), Fixed WW, 860 Ohms ±5%, 10W	1
-91		96906	Commercial	●● Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-92		96906	Commercial	●● Washer, Internal Tooth, No. 8 (AP)	1
-93		96906	Commercial	●● Nut, 6/32, NC2 (AP)	1
-94		96906	Commercial	●● Washer, Shoulder, No. 8 (AP)	1
-95		96906	Commercial	●● Nut, Self-Locking No. 8 (AP)	1
-96		81349	RW31G102	●● Resistor (R16), Fixed WW, 1K Ohms ±5%, 10W	1
-97		96906	Commercial	●● Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-98		96906	Commercial	●● Washer, Internal Tooth, No. 8 (AP)	1
-99		96906	Commercial	●● Nut, 6/32, NC2 (AP)	1
-100		96906	Commercial	●● Washer, Shoulder, No. 8 (AP)	1
-101		96906	Commercial	●● Nut, Self-Locking No. 8 (AP)	1

Figure/ Index No.	SMR Code	CAGE Code	Part Number	Description	Qty
-102		81349	RW31G132	●● Resistor (R17), Fixed WW, 1.3K Ohms ±5%, 10W	1
-103		96906	Commercial	●● Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-104		96906	Commercial	●● Washer, Internal Tooth, No. 8 (AP)	1
-105		96906	Commercial	●● Nut, 6/32, NC2 (AP)	1
-106		96906	Commercial	●● Washer, Shoulder, No. 8 (AP)	1
-107		96906	Commercial	●● Nut, Self-Locking No. 8 (AP)	1
-108		81349	RW31G202	●● Resistor (R18), Fixed WW, 2K Ohms ±5%, 10W	1
-109		96906	Commercial	●● Screw, 6/32, NC2 x 2 1/4, RHMS (AP)	1
-110		96906	Commercial	●● Washer, Internal Tooth, No. 8 (AP)	1
-111		96906	Commercial	●● Nut, 6/32, NC2 (AP)	1
-112		96906	Commercial	●● Washer, Shoulder, No. 8 (AP)	1
-113		96906	Commercial	●● Nut, Self-Locking No. 8 (AP)	1
-114		81349	RW32G312	●● Resistor (R19), Fixed WW, 3.1K Ohms ±5%, 12W	1
-115		96906	Commercial	●● Screw, 6/32, NC2 x 2 3/4, RHMS (AP)	1
-116		96906	Commercial	●● Washer, Internal Tooth, No. 8 (AP)	1
-117		96906	Commercial	●● Nut, 6/32, NC2 (AP)	1
-118		96906	Commercial	●● Washer, Shoulder, No. 8 (AP)	1
-119		96906	Commercial	●● Nut, Self-Locking No. 8 (AP)	1
-120		81349	RW32G352	●● Resistor (R20), Fixed WW, 3.5K Ohms ±5%, 12W	1
-121		96906	Commercial	●● Screw, 6/32, NC2 x 2 3/4, RHMS (AP)	1

Figure/ Index No.	SMR Code	CAGE Code	Part Number	Description	Qty
-122		96906	Commercial	●● Washer, Internal Tooth, No. 8 (AP)	1
-123		96906	Commercial	●● Nut, 6/32, NC2 (AP)	1
-124		96906	Commercial	●● Washer, Shoulder, No. 8 (AP)	1
-125		96906	Commercial	●● Nut, Self-Locking No. 8 (AP)	1
-126		81349	RW33G502	● Resistor (R21), Fixed WW, 5000 Ohms, ±5%, 18W	1
-127		96906	Commercial	● Screw (AP)	1
-128		96906	Commercial	● Nut, Self-Locking (AP)	1
-129		81349	RW33G702	● Resistor (R22), Fixed WW, 7500 Ohms, ±5% 24W	1
-130		96906	Commercial	● Screw (AP)	1
-131		96906	Commercial	● Nut, Self-Locking (AP)	1
-132		81349	RW34G902	● Resistor (R23), Fixed WW, 9000 Ohms, ±5%, 30W	1
-133		96906	Commercial	● Screw (AP)	1
-134		96906	Commercial	● Nut, Self-Locking (AP)	1
-135		96906	SC-D-86027	● Plate	1
-136		96906	Commercial	● Screw (AP)	2
-137		96906	Commercial	● Nut, Self-Locking (AP)	2
-138		96096	Commercial	● Bracket	1
-139		96906	Commercial	● Bracket	1
-140		81349	SC-B-86024	● Board, Terminal, (See Detail B for breakdown)	1
-141		96906	Commercial	● Screw (AP)	2
-142		96096	Commercial	● Nut, Self-Locking (AP)	2
-143		81349	RC30BF303J	●● Resistor (R13), Fixed Comp, 30K Ohms, ±5%, 1W	1
-144		81349	RC30BF393J	●● Resistor (R14), Fixed Comp, 39K Ohms, ±5%, 1W	1

Figure/ Index No.	SMR Code	CAGE Code	Part Number	Description	Qty
-145		81349	RC30BF123J	●● Resistor (R24), Fixed Comp, 12K Ohms, ±5%, 1W	1
-146		81349	RC30BF153J	●● Resistor (R25), Fixed Comp, 15K Ohms, ±5%, 1W	1
-147		81349	RC30BF513J	●● Resistor (R26), Fixed Comp, 51K Ohms, ±5%, 1W	1
-148		81349	JAN-J-641	● Jack, Telephone, 3 conductor	32
-149		96906	P/O JAN-J-641	● Nut (AP)	32
-150		96906	P/O JAN-J-641	● Washer (AP)	32
-151				● Panel	1

Figure/ Index No.	SMR Code	CAGE Code	Part Number	Description	Qty
6-3		32677	SC-D-86007	Case Assembly (See Figur 6-1 for NHA)	REF
-1		32677	SC-D-86010	• Case	1
-2		32677	SC-D-86007-4	•• Handle	1
-3		96906	100-3S4-6	•• Screw (AP)	2
-4		32677	SC-D-20648	•• Catch	2
-5		32677	SC-D-20650-27	•• Catch, Top	2
-6		32677	160-1	•• Gasket (not Illustrated)	1
-7		32677	SC-D-86008	• Cover	1
-8		32677	SC-D-86007-5	• Hinge (AP) (not Illustrated)	2
-9		32677	SC-D-86007-1	•• Binder, Ring (not Illustrated)	1
-10		32677	SC-D-86007-6	•• Clip	4

SAFETY SUMMARY

DEFINITIONS

The following definitions apply to WARNINGS and CAUTIONS found throughout this publication.

CAUTION

An operation or maintenance procedure, practice, condition, statement, etc., which, if not strictly observed could result in injury or health hazards to personnel.

WARNING

An operating or maintenance procedure, practice, statement, etc., which, if not strictly observed could result in damage/destruction of equipment or loss of mission effectiveness.